

REMARKS

Claims 1, 7-8, 10, 14 and 17 were amended and new claim 19 was added. The amendments and new claim are supported by, e.g., pages 1-2, 7, as well as FIGS. 1 and 3, the claims, and elsewhere in the application as filed, whereby no new matter is added. No claims were cancelled, whereby claims 1-19 are therefore pending and presented for review. Favorable reconsideration and allowance are requested in light of the remarks which follow.

1. 35 U.S.C. § 112 Rejections

The Examiner rejected claim 7 under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants amended claim 7, clarifying a meaning of the offending term, and correspondingly resolving the issue.

2. Prior Art Rejections

The Examiner rejected claims 1-3, 5-9, and 18 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,688,439 to Cureton et al. (herein "the Cureton patent"). Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the Cureton patent. Claims 10-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Cureton patent in view of U.S. Patent No. 5,063,829 to Takao et al. (herein "the Takao patent"). Applicants respectfully assert that the amendments to claims 1, 10, and 17 obviate all of the rejections of claims 1-18 because, as is discussed below, the Cureton patent alone, or combined with the Takao patent, does not and cannot disclose all of the limitations of independent claims 1, 10, and 17. It is further asserted that the Takao patent teaches strongly away from the claimed invention.

a. Recapitulation of the Invention*

The invention relates to a wobble drive for converting a rotational motion into an oscillating translational motion. The wobble drive includes a rotationally driven rotating element that drives and acts on a wobble element in a manner that tilts the wobble element back and forth. Such back and forth tilting of the wobble element can drive another component into linear

* This Section 2(a) is presented for background purposes so the Examiner may understand the state of the art and, in general terms, the Applicants' contribution thereto. It is not intended to particularly address the obviation of any particular rejection. That task instead is performed in Section 2(b) below.

translational motion, such as a piston within a percussion mechanism of an impact tool.

Prior art impact tools include wobble drives and wobble fingers that are driven into wobbling motions which are converted into linear motions. Each of such wobble fingers represents a significant imbalance mass that, at faster speeds of motion (several hundred impacts per minute), results in significant additional oscillating bearing loads, acting both on the machine (bearing, housing) and on the operator holding the machine. Since the machines incorporating the wobble drives are often hammer-type devices, the operator is exposed not only to impact loading due to the impacts executed by the hammer during use, but also to the imbalance loading resulting from the moving wobble finger. Prolonged operator exposure to such loads and associated vibrations are less than desirable for the user, and can reduce the use-life of the tool itself.

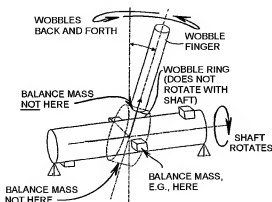
In the present invention, a wobble drive is provided that attenuates the wobble finger imbalanced mass-based oscillating bearing loads. This is done by providing at least one balance mass on a pivot bearing at a location that is spaced from the wobble finger and surprisingly also spaced from a position on the pivot bearing that is on the other side of the wobble ring, radially across from the wobble finger. For example, providing two balance masses that are spaced 90-degrees from the wobble finger can be a suitable configuration. Regardless of the particular configuration or location, the at least one balance mass on the pivot bearing reduces the undesired vibrational forces, increases user comfort, and can increase tool use-life.

b. Obviation of Rejections

Applicants respectfully point out that the amendments to claims 1, 10, and 17 obviate the rejections of claims 1-18. The Takao patent does not and cannot disclose each and every element of novel and non-obvious independent claims 1, 10, and 17.

Independent claims 1, 10, and 17, as amended, recite a wobble drive having a pivot bearing that is situated on a shaft in an inclined position and supports a wobble ring thereon. **The wobble ring wobbles back and forth upon the shaft without rotating with the shaft.** A wobble finger extending radially from the wobble ring and at least one balance mass is provided on the wobble ring in a location that is spaced from the wobble finger (or point of intersection of

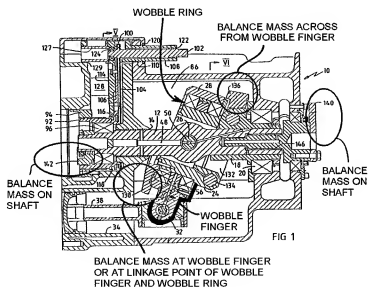
the wobble finger and the wobble ring) and also spaced from a point on the wobble ring that is across from the wobble finger. In other words, **the at least one balance mass is provided on the wobble ring, but (i) is not across from the wobble finger, and (ii) is not at the intersection of the wobble finger and ring (see drawing below).**



The Cureton patent alone, or combined with the Takao patent, does not and cannot disclose a wobble drive having a **wobble ring that does not rotate with a shaft** but rather wobbles back and forth upon the shaft, and **a balance mass on the wobble ring at a location that is neither across from a wobble finger, nor at a linkage point between the wobble finger and ring.**

The Cureton patent discloses a wobble plate or swash plate-type engine 10 that includes a wobble plate 28 that drives a hub 24 which is connected to a shaft 12 by a pin 26. As multiple pistons 36 reciprocate within cylinders 34 (FIGS. 1 and 5), they sequentially press against respective portions of the wobble plate 28, causing a precession-type rotation of the wobble plate, which forces the hub 24 and shaft 12 to rotate. Vibrations in the engine 10 are reduced by providing an air/oil mixture that serves as a lubricant and as a damping medium within space 80 of the joint connecting the piston 36 and the hub 24 (Col. 8, Lines 10-29). Vibrations are also reduced by providing opposed masses 140 and 142 on a shaft, and masses 136 and 138 that are

located across from a wobble finger and at a wobble finger or linkage / intersection of the wobble finger and a wobble ring (see annotated FIG. 1 below).

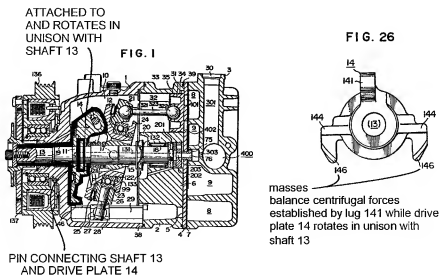


The Cureton Patent, Annotated FIG. 1

In other words, the Cureton patent discloses a wobble drive that provides balance masses directly at a linkage point between a wobble finger and ring, and also directly across from the wobble finger. This directly conflicts with the subject matter of independent claims 1, 10, and 17, each of which requires the opposite of such balance mass location(s). Such express disclosure that purposefully requires features that directly contradict the subject matter of Applicants' invention is a strong teaching away from the claimed subject matter.

The Takao patent discloses a variable displacement wobble-type compressor for an automotive air conditioner. The compressor has an input shaft 13 and a drive plate 14 that is attached or fastened thereto, whereby the drive plate 14 rotates in unison with the shaft 13. The shaft 13 and attached drive plate 14 together rotate a swash plate 12 that is inclined with respect to the shaft 13, whereby the swash plate 12 rotates in a precession-type path and sequentially presses against perimeter segments of a piston support ring 21. This precessional rotation of swash plate 12 forces reciprocal motion of piston(s) 31 within cylinder(s) 33. Balance

masses 146 are provided on the drive plate 14 rotating in unison with the shaft 13, for cancelling or reducing system vibration (Col. 9, Line 32 to Col. 10, Line 4) caused by the various components by specifically “*reduc[ing] unbalance of the centrifugal force[s]” and correspondingly NOT wobble movement-induced forces (Col. 17, Lines 22-23, emphasis added; see annotated FIGS. 1 and 26 below).*



It is noted that drive plate 14 does not wobble in any regard. Rather, drive plate 14 rotates in unison with shaft 13 along a constant, non-wavering travel path that extends circumferentially around an axis of rotation of shaft 13. In other words, the Takao patent discloses a wobble drive that **provides balance masses on a non-wobbling component that rotates in unison with a shaft.** This directly conflicts with the subject matter of independent claims 1, 10, and 17, each of which requires the opposite of such balance mass location(s). Here too, such express disclosure that purposefully requires features that directly contradict the subject matter of Applicants' invention is a *strong teaching away* from the claimed subject matter.

Independent claims 1, 10, and 17 are therefore believed to be non-obvious over the cited prior art at least for these reasons, whereby a hypothetical obviousness rejection of the amended claims based on the cited prior art would be improper by definition.

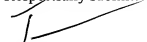
Each of claims 2-9, 11-16, and 18 is allowable as depending from respective ones of allowable independent claims 1, 10, and 17, directly or indirectly, as well as each on its own merits. For example, claim 7 recites a balance mass on a shaft that is adjacent a bearing point, such that an axial distance therebetween is minimal, which is not disclosed or suggested in the cited prior art.

New Claim and Conclusions

New claim 19 is directed generally toward the subject matter of claims 1, 10, and 17, whereby it is believed allowable at least for the above-stated reasons, only doing so with even greater specificity. For example, new claim 19 further recites that the wobble finger maintains essentially an unchanged orientation transversely with respect to the shaft while tilting back and forth longitudinally along the shaft.

Claims 1-19 are therefor in compliance with 35 U.S.C. §§ 102, 103, and 112, and each defines patentable subject matter. A Notice of Allowance is therefore respectfully requested. A fee in the amount of \$220 is believed due for the one additional independent claim in excess of three. No other payment is believed due with this communication. Nevertheless, should the Examiner consider any other fees to be payable in conjunction with this or any future communication, the Director is authorized to direct payment of such fees, or credit any overpayment, to Deposit Account No. 50-1170.

Respectfully submitted,



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Dated: November 5, 2008

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